Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

$$=\tfrac{1}{2}\left[\frac{1}{n-1}+\frac{1}{3(n-3)}+\frac{1}{5(n-5)}+\dots\dots\frac{1}{(n-1)1}\right].\quad \text{Q. E. D.}$$

Also solved by G. W. Greenwood, G. B. M. Zerr, and the Proposer.

239. Proposed by J. J. KEYES, Fogg High School, Nashville, Tenn.

Solve $\sqrt[4]{(41+x)}+\sqrt[4]{(41-x)}=4$.

Solution by W. L. TRYON, Cornell University, Ithaca, New York.

Denote the equation by $m+n=4$ ....(1). Then $m^4+n^4=82$..........(2).

Raising (1) to the fourth power, subtracting (2), and dividing by 2, we obtain

$$2mn(m+n)^2-m^2n^2=87,$$

$$i.\ e.,\qquad m^2n^2-32mn=87.$$

$$\therefore\quad mn=3 \text{ or } 29.$$

$$m=1,\ 3,\ 2\pm5i.$$

$$\therefore\quad 41+x=1,\ 81,\ 41\pm840i.$$

$$x=\pm40,\ \pm840i.$$

Also solved by P. S. Berg, G. W. Greenwood, J. J. Keyes, F. P. Matz, J. Scheffer, J. Edward Sanders, Jacob Westlund, and G. B. M. Zerr.

240. Proposed by F. P. MATZ, Sc. D., Ph. D.

Solve $a^2x+b^2y=ax^2+by^2=x^3+y^3$.

I. Solution by G. W. GREENWOOD. M. A., Professor of Mathematics and Astronomy, McKendree College, Lebanon, Ill.

We have $(x^3+y^3)(a^2x+b^2y)=(ax^2+by^2)^2$, from which we obtain $xy=0$, and $ay=bx$. Substituting in either of the original equations we obtain for x, y the pairs of values $(0,\ 0)$, $(a,\ b)$.

II. Solution by A. H. HOLMES, Brunswick, Maine.

From $a^2x+b^2y=ax^2+by^2$ we have $ax(a-x)=by(y-b)$ .... (1).

From $ax^2+by^2=x^3+y^3$ we have $x^2(a-x)=y^2(y-b)$ ....(2).

Dividing (1) by (2), $\dfrac{a}{x}=\dfrac{b}{y}$. $\therefore y=\dfrac{b}{a}x$.

$$\therefore a^2x-ax^2=\frac{b^3x^2}{a^2}-\frac{b^3x}{a}.\qquad \therefore x=\frac{a^4+ab^3}{a^3+b^3};\ y=\frac{b}{a}x=\frac{a^3b+b^4}{a^3+b^3}.$$

Also solved by M. R. Beck, M. E. Graber, B. F. Finkel, J. E. Sanders, Elmer Schuyler, G. B. M. and the Proposer.

241. Proposed by L. E. NEWCOMB, Los Gatos, Cal.

Sum to infinity $\frac{1}{2}+\frac{1}{3}+\frac{1}{8}+\frac{1}{30}+\frac{1}{144}+\frac{1}{840}+$..........(1).

Solution by ELMER SCHUYLER, Brooklyn, New York.

Separate the denominators into their prime factors; then (1) becomes

$$\frac{1}{1.2}+\frac{1}{1.3}+\frac{1}{1.2.4}+\frac{1}{1.2.3.5}+\frac{1}{1.2.3.4.6}\dots\dots(2).$$

Series (2) is equivalent to $\frac{1}{2!}+\frac{2}{3!}+\frac{3}{4!}$..............$\frac{n}{(n+1)\,!}$..............

*This becomes $\sum\limits_{n=1}^{\infty}\frac{n}{n+1!}=\sum\limits_{n=1}^{\infty}\left(\frac{1}{n!}-\frac{1}{(n+1)\,!}\right)=1.$

Also solved by **G. B. M. Zerr**, and the **Proposer**.

AVERAGE AND PROBABILITY.

---

165. Proposed by HENRY HEATON, Atlantic, Iowa.

What is the average length of all straight lines that can be drawn within a given square parallel to one of the diagonals?

I. Solution by R. D. CARMICHAEL, Hartselle, Ala.

Their intersections along the other diagonal will be evenly distributed. The average length is thus readily seen to be one-half the diagonal$=\frac{1}{2}a\sqrt{2}$, where a=the side of the square.

II. Solution by J. EDWARD SANDERS, Hackney, Ohio.

Since the greatest length is $a\sqrt{2}$, and the least 0, the average length is $\frac{1}{2}(a\sqrt{2}+0)=\frac{1}{2}a\sqrt{2}$; or by calculus,

$$\Delta=\frac{1}{a}\int_0^a x\sqrt{2}\,dx=\tfrac{1}{2}a\sqrt{2}.$$

Also solved by **F. P. Matz**, and **G. B. M. Zerr**.

166. Proposed by F. P. MATZ, Sc. D., Ph. D.

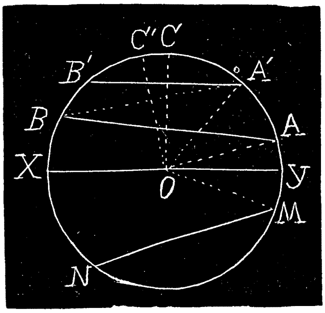
Find the average area intercepted by two non-intersecting chords drawn at random in a given circle.

Solution by the PROPOSER.

First Case. The two chords AB and $A'B'$ may be on the *same* side of the diameter XY.

Let $OA=r$, $\angle OAB=\theta$, $\angle OA'B'=\phi$, $\angle YOA'=\psi$, and $\angle YOA=\omega$; then area

$AA'B'B=U_1=(\phi-\theta+\sin\phi\,\cos\phi-\sin\theta\,\cos\theta)r^2$.



$$\therefore\ A_1=\frac{\int_0^{\frac{1}{2}\pi}\int_\theta^{\frac{1}{2}\pi}\int_0^{2\pi}\int_\omega^{\frac{1}{2}\pi}U_1\,d\theta\,d\phi\,d\omega\,d\psi}{\int_0^{\frac{1}{2}\pi}\int_\theta^{\frac{1}{2}\pi}\int_0^{2\pi}\int_\omega^{\frac{1}{2}\pi}d\theta\,d\phi\,d\omega\,d\psi}$$

---

*C. Smith, *Treatise on Algebra*, p. 396, Ex. 2.